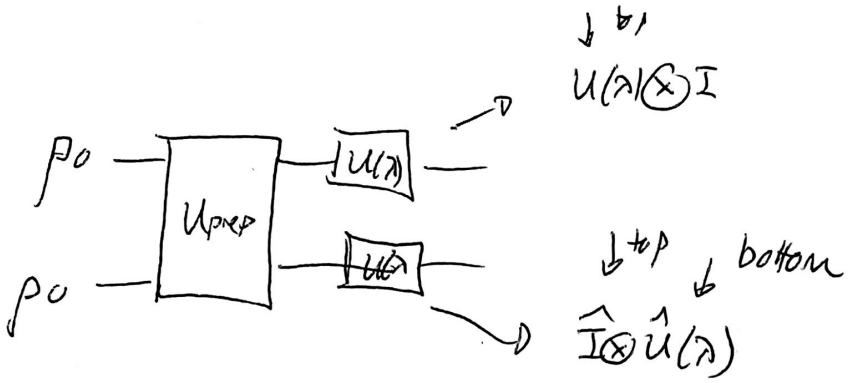
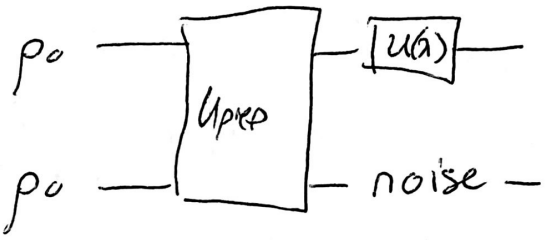


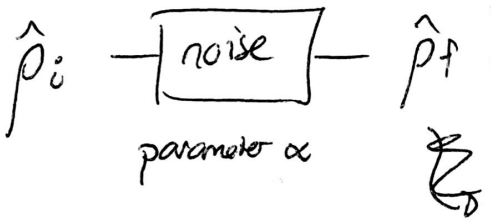
noise in spectator



what type of noise? Many possibilities

- depolarizing
- amplitude damping
- dephasing (phase flip)

How to model noise? What does it do to state of system



Phase flip - keeps state as it was with prob $(1-\alpha)$

- does (rotation about z) with α

$|0\rangle+|1\rangle \to |0\rangle-|1\rangle$

$$\hat{\rho}_f = (1-\alpha)\hat{\rho}_i + \alpha\,\hat{\sigma}_z\hat{\rho}_i\hat{\sigma}_z$$

Exercise: Get final density op if

a) Initial state is $|0\rangle$

" " " $|1\rangle$

b) " " " $\frac{|0\rangle + |1\rangle}{\sqrt{2}}$

c) " " " $\frac{1}{\sqrt{2}}(|0\rangle - i|1\rangle)$

In each case express final density op in form

$$\frac{1}{2}\left(\hat{I} + r_x\hat{\sigma}_x + r_y\hat{\sigma}_y + r_z\hat{\sigma}_z\right)$$

Is state pure or not?

Then need noise maps?

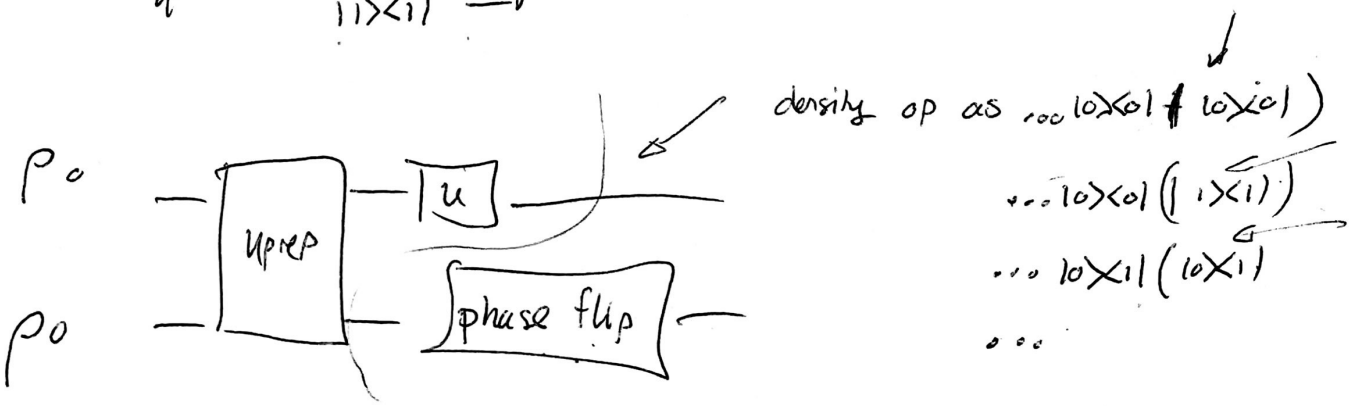
one qubit

$|0\rangle\langle 0| \to$ state?

$|0\rangle\langle 1| \to$ ... $|?\rangle\langle ?| + \ldots |?\rangle\langle ?|$

$|1\rangle\langle 0| \to$

$|1\rangle\langle 1| \to$



~~$|0\rangle\langle 1|$ $|0\rangle\langle 1|$~~

$|0\rangle\langle 1|$